General

Guideline Title

Surgical management of endocarditis: the Society of Thoracic Surgeons clinical practice guideline.

Bibliographic Source(s)

Byrne JG, Rezai K, Sanchez JA, Bernstein RA, Okum E, Leacche M, Balaguer JM, Prabhakaran S, Bridges CR, Higgins RS. Surgical management of endocarditis: the Society of Thoracic Surgeons clinical practice guideline. Ann Thorac Surg. 2011 Jun;91(6):2012-9. [40 references] PubMed

Guideline Status

This is the current release of the guideline.

Recommendations

Major Recommendations

The levels of evidence (A–C) and classification of recommendations (I–III) are defined at the end of the "Major Recommendations" field.

Neurologic Complications in Endocarditis

Radiographic Evaluation of Patients with Stroke and Endocarditis

1. Brain imaging is required if there is suspicion of stroke in the setting of endocarditis. Either magnetic resonance imaging (MRI) or computed tomography (CT) is an acceptable initial study. (Class I, Level of Evidence B)
2. If MRI is chosen, diffusion weighted imaging, fluid attenuated inversion recovery (FLAIR) imaging, gradient echo imaging, and a postcontrast study, should be performed. (Class I, Level of Evidence B)
3. If MRI is not feasible, CT should be performed. (Class I, Level of Evidence B)
4. Vascular imaging should be performed contemporaneously with brain imaging. Magnetic resonance angiography (MRA) and computed tomography angiography (CTA) are both acceptable vascular imaging modalities to screen for mycotic aneurysm in patients without evidence of intracranial hemorrhage. (Class I, Level of Evidence C)
5. It is reasonable to reserve catheter angiography for patients with evidence of intracranial bleeding, or noninvasive vascular imaging suggestive of mycotic aneurysm. (Class IIa, Level of Evidence C)

Timing of Surgery in Patients with Neurologic Complications

1. In patients who have had a major ischemic stroke or any intracranial hemorrhage, it is reasonable to delay valve replacement for at least 4 weeks from the stroke, if possible. (Class IIa, Level of Evidence C)

2. If there is a decline in cardiac function, recurrent stroke or systemic embolism or uncontrolled infection despite adequate antibiotic therapy, a delay of less than 4 weeks may be reasonable, particularly in patients with small areas of brain infarction. (Class IIb, Level of Evidence C)

Intracranial Hemorrhage and Mycotic Aneurysms

1. Heparin is the major modifiable risk factor for brain hemorrhage in infectious endocarditis (IE). It should be used cautiously in all patients, and should be withheld for 4 weeks after brain hemorrhage in the context of IE. (Class I, Level of Evidence B)
2. For patients with IE and intracranial hemorrhage, catheter angiography should be performed to rule out mycotic aneurysms (MA) with consideration of surgical or endovascular therapy. (Class I, Level of evidence B)
3. Once patients with IE but without neurologic symptoms have been screened to identify MA, it may be reasonable to follow mycotic aneurysms noninvasively to rule out aneurysmal expansion during antibiotic therapy. (Class IIb, Level of Evidence C)
4. Aneurysms that expand during antibiotic therapy may be considered for surgical therapy. It may be reasonable to follow conservatively aneurysms that remain stable or decrease in size during antibiotic treatment. (Class IIb, Level of Evidence C)

Aortic Valve Endocarditis

Native Aortic Valve Endocarditis

1. When surgery is indicated, a mechanical or stented tissue valve is reasonable in native aortic valve endocarditis if the infection is limited to the native aortic valve or to the aortic annulus. Valve choice should be based on age, life expectancy, comorbidities, and compliance with anticoagulation. (Class IIa, Level of Evidence B)
2. A homograft may be considered in native aortic valve endocarditis when the infection is limited to the native aortic valve or to the aortic annulus. (Class IIb, Level of Evidence B)

Native Aortic Valve Endocarditis with Periannular Abscess

1. When periannular abscess is associated with IE, it is reasonable to use a mechanical or stented tissue valve if radical debridement is carried out and the valve can be anchored to healthy and strong tissue. (Class IIa, Level of Evidence B)
2. It may be reasonable to use a homograft in native aortic valve endocarditis with periannular abscess and extensive annular or aortic wall destruction requiring aortic root replacement/reconstruction or extensive aortic-ventricular discontinuity. (Class IIb, Level of Evidence B)

Prosthetic Aortic Valve Endocarditis

1. When surgery is indicated, in patients with aortic prosthetic valve endocarditis (PVE) limited to the prosthesis without aortic root abscess, and no annular destruction, it is reasonable to implant a mechanical or stented tissue valve. (Class IIa, Level of Evidence B)

Prosthetic Valve Endocarditis with Periannular Abscess

1. A homograft can be beneficial in aortic PVE when periannular abscess or extensive ventricular-aortic discontinuity is present, or when aortic root replacement/reconstruction is necessary because of annular destruction or destruction of anatomical structures. (Class IIa, Level of Evidence B)

Mitral Valve Endocarditis

Native Mitral Valve Endocarditis

1. When technically feasible, mitral valve repair is recommended to treat native mitral valve endocarditis. (Class I, Level of Evidence B)
2. When surgery is indicated, mechanical or stented tissue valves can be useful for mitral valve replacement as appropriate given age, life expectancy, and comorbidities. (Class IIa, Level of Evidence B)

Mitral Prosthetic Valve Endocarditis

1. When surgery is indicated for prosthetic mitral valve endocarditis, either mechanical or stented tissue valves may be considered for valve replacement. The choice of whether either a tissue or mechanical valve should be implanted should be based primarily on consideration of age, life expectancy, and presence of comorbidities. (Class IIb, Level of Evidence C)

Tricuspid Valve Endocarditis

Native Tricuspid Valve Endocarditis

1. When surgery is indicated, tricuspid valve repair is recommended for native tricuspid valve endocarditis. (Class I, Level of Evidence B)

2. Mechanical or stented tissue valves can be useful in native tricuspid valve endocarditis, if the valve cannot be repaired. (Class IIa, Level of Evidence C)

Multiple Valve Endocarditis

1. In the presence of multiple valve endocarditis involving the aortic valve, the decision to choose a homograft for the aortic valve should follow the same algorithm outlined for isolated aortic valve endocarditis. (Class I, Level of Evidence C)
2. In the presence of concomitant aortic or mitral or tricuspid valve endocarditis, in the aortic, mitral, and tricuspid positions, either a stented tissue or mechanical valve can be implanted. The choice of valve should follow the same algorithm outlined independently for aortic, mitral, and tricuspid valve endocarditis. (Class I, Level of Evidence B)
3. When surgery of the mitral and tricuspid valves is indicated for multiple valve endocarditis, it can be beneficial to perform mitral and tricuspid valve repair whenever feasible. (Class IIa, Level of Evidence B)

Definitions:

Level of Evidence

Level A: Data derived from multiple randomized clinical trials or meta-analyses

Level B: Data derived from a single randomized trial or from nonrandomized studies

Level C: Consensus opinion of experts, case studies, or standard of care

Classification of Recommendations

Class I: Evidence and/or general agreement that a given procedure or treatment is useful and effective

Class II: Conflicting evidence and/or a divergence of opinion about the usefulness/efficacy of a procedure or treatment

IIa: Weight of evidence/opinion is in favor of usefulness/efficacy

IIb: Usefulness/efficacy is less well established by evidence/opinion

Class III: Evidence and/or general agreement that the procedure/treatment is not useful/effective, and in some cases may be harmful

Clinical Algorithm(s)

None provided

Scope

Disease/Condition(s)

Endocarditis, including native and prosthetic valve infections and septic neurologic manifestations

Guideline Category

Evaluation

Management

Treatment

Clinical Specialty

Cardiology

Infectious Diseases

Neurology

Thoracic Surgery

Intended Users

Advanced Practice Nurses

Physician Assistants

Physicians

Guideline Objective(s)

To make recommendations for the management of endocarditis in common and complex clinical situations including native and prosthetic valve infections, septic neurologic manifestations

Target Population

Patients with endocarditis involving native or prosthetic valves or with septic neurologic manifestations

Interventions and Practices Considered

1. Radiologic evaluation of patients with stroke and endocarditis
    - Brain imaging: magnetic resonance imaging (MRI), computed tomography (CT)
    - Vascular imaging: computed tomography angiography (CTA), magnetic resonance angiography (MRA), catheter angiography
2. Timing of surgery in patients with neurologic complications
3. Cautious use of heparin
4. Surgery for native or prosthetic valve endocarditis
    - Replacement with mechanical or stented tissue valves; homograft
    - Valve repair

Major Outcomes Considered

- Morbidity
- Mortality
- Valvular incompetence
- Embolization
- Cerebrovascular accidents
- Congestive heart failure

Methodology

Methods Used to Collect/Select the Evidence

Hand-searches of Published Literature (Primary Sources)

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

A MEDLINE search for literature from January 2000 to December 2010 was completed. The keywords searched were as follows: "infective endocarditis," "aortic valve surgery," "mitral valve surgery," "mitral valve repair," "tricuspid valve surgery," "tricuspid valve repair," "treatment," "extensive infective endocarditis," "periannular abscess," "complex infective endocarditis," "periannular endocarditis," "valve replacement," "valve repair," "valve surgery", "native valve endocarditis," "prosthetic valve endocarditis," "right-sided endocarditis," "left-sided endocarditis," and all combinations.

A manual search was also performed in nine cardiology and cardiothoracic journals.

Number of Source Documents

Not stated

Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

Level of Evidence

Level A: Data derived from multiple randomized clinical trials or meta-analyses

Level B: Data derived from a single randomized trial or from nonrandomized studies

Level C: Consensus opinion of experts, case studies, or standard of care

Methods Used to Analyze the Evidence

Systematic Review

Description of the Methods Used to Analyze the Evidence

Not stated

Methods Used to Formulate the Recommendations

Expert Consensus

Description of Methods Used to Formulate the Recommendations

The classification system used in this guideline to summarize recommendations is used by the American College of Cardiology (ACC) and American Heart Association (AHA). Each recommendation is scored for its efficacy and the strength of the evidence upon which it is based (see the "Rating Scheme for the Strength of the Evidence" and the "Rating Scheme for the Strength of the Recommendations" fields).

Rating Scheme for the Strength of the Recommendations

Classification of Recommendations

Class I: Evidence and/or general agreement that a given procedure or treatment is useful and effective

Class II: Conflicting evidence and/or a divergence of opinion about the usefulness/efficacy of a procedure or treatment

IIa: Weight of evidence/opinion is in favor of usefulness/efficacy

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Class III: Evidence and/or general agreement that the procedure/treatment is not useful/effective, and in some cases may be harmful

Cost Analysis

A formal cost analysis was not performed and published cost analyses were not reviewed.

Method of Guideline Validation

Not stated

Description of Method of Guideline Validation

Not applicable

Evidence Supporting the Recommendations

Type of Evidence Supporting the Recommendations

The type of supporting evidence is identified and graded for each recommendation (see the "Major Recommendations" field).

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

Appropriate management of endocarditis in common and complex clinical situations

Potential Harms

- Potential concerns in mitral valve repair are durability, the possibility of recurrent infection due to incomplete resection of infected valvular tissue, and the use of prosthetic annuloplasty rings.
- Replacement of the tricuspid valve involves implanting prosthetic material in the setting of ongoing infection, with the risk of reinfection and the need for anticoagulation therapy if a mechanical valve is implanted. Thrombus and pannus formation is more frequent, while structural valve degeneration is less extensive in the tricuspid position. These issues are enhanced in the intravenous drug use population in whom right-sided endocarditis is more frequent. This population is younger than the left-sided endocarditis population and more likely not to comply with the anticoagulation regimen.
- Heparin is the major modifiable risk factor for brain hemorrhage in infectious endocarditis (IE). It should be used cautiously in all patients, and should be withheld for 4 weeks after brain hemorrhage in the context of IE.

Contraindications

Contraindications

After stroke, neurologic deterioration can occur owing to spontaneous conversion, hemorrhagic transformation while being anticoagulated for cardiopulmonary bypass, or exacerbation or expansion of ischemia due to hypotension during cardiac surgery. These factors make a recent embolic stroke a relative contraindication to valve replacement surgery in infective endocarditis. However, the risk of intracranial hemorrhage may be dependent on the extent and size of infarction, whether it is ischemic or hemorrhagic, and the exact timing of surgery.

Qualifying Statements

Qualifying Statements

The Society of Thoracic Surgeons Clinical Practice Guidelines are intended to assist physicians and other health care providers in clinical decision-making by describing a range of generally acceptable approaches for the diagnosis, management, or prevention of specific diseases or conditions. These guidelines should not be considered inclusive of all proper methods of care or exclusive of other methods of care reasonably directed at obtaining the same results. Moreover, these guidelines are subject to change over time, without notice. The ultimate judgment regarding the care of a particular patient must be made by the physician in light of the individual circumstances presented by the patient.

Implementation of the Guideline

Description of Implementation Strategy

An implementation strategy was not provided.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Getting Better

IOM Domain

Effectiveness

Identifying Information and Availability

Bibliographic Source(s)

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Adaptation

Not applicable: The guideline was not adapted from another source.

Date Released

2011 Jun

Guideline Developer(s)

Society of Thoracic Surgeons - Medical Specialty Society

Source(s) of Funding

Society of Thoracic Surgeons

Guideline Committee

Society of Thoracic Surgery Workforce on Evidence-Based Surgery

Composition of Group That Authored the Guideline

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Financial Disclosures/Conflicts of Interest

Not stated

Guideline Status

This is the current release of the guideline.

Guideline Availability

Electronic copies: Available from the Society of Thoracic Surgeons Web site .

Print copies: Available from The Society of Thoracic Surgeons, 633 N. Saint Clair St., Suite 2320, Chicago, IL, USA 60611-3658

Availability of Companion Documents

None available

Patient Resources

None available

NGC Status

This NGC summary was completed by ECRI Institute on June 14, 2012. This summary was updated by ECRI Institute on March 10, 2014 following the U.S. Food and Drug Administration advisory on Low Molecular Weight Heparins.

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